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I, KAY WARD, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PP 8258 for a patent by NALCO CHEMICAL COMPANY filed on 20 January 1999.

WITNESS my hand this
Twenty-fourth day of January 2000

Kaland

KAY WARD
TEAM LEADER EXAMINATION
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AUSTRALIA

PATENTS ACT 1990

PROVISIONAL SPECIFICATION

FOR THE INVENTION ENTITLED:-

"FILTRATION AID FOR THE BAYER PROCESS"

The invention is described in the following statement:-

TECHNICAL FIELD

The present invention relates to treating agents and particularly to treating agents for filtration of caustic sodium aluminate solutions from the Bayer process.

BACKGROUND ART

In the Bayer process, alumina is refined from bauxite ores. The process comprises digesting the ore in a caustic solution to extract alumina, clarifying the liquor to remove caustic insoluble red mud material and precipitating alumina crystals as its trihydrate form from the clarified liquor. Clarifying the liquor involves separating the solid particles from the liquor by settling and if necessary, filtration.

The clarified, filtered liquor is then cooled until it becomes super-saturated and seeded with crystals of alumina trihydrate. Alumina is precipitated as the trihydrate in tanks and the solids are classified by particle size. The coarse fraction of alumina trihydrate (primary) is then dewatered eg by rotary vacuum filters and washed to reduce its soda level. The alumina product is then transferred to calciners where any free or combined water is removed if it is intended that the alumina be used in the manufacture of aluminium metal. If the alumina is to be used in other applications, some of the free water will be removed but not necessarily the water of hydration.

As discussed in US patent no 5,091,159 (incorporated herein by reference), it has been found that dextran is a particularly suitable treating agent for filtration. The dextran is added to the liquor, which preferably already contains a calcium aluminate filter aid, in quantities of 0.5-15 mg/l as the only treating agent. This addition of dextran has been shown to give substantial improvements in filtration time.

Of course, in the quantities used in the Bayer process, such additions of dextran can be quite expensive.

The present invention seeks to overcome at least some of the disadvantages of the prior art or at least provide a commercial alternative thereto.

DISCLOSURE OF THE INVENTION

In a broad first aspect, the present invention provides a treating agent for use in the Bayer process in filtration of caustic sodium alumina solution said treating agent comprising a blend of polysaccharide and starch.

Preferably, the polysaccharide of the treating agent is pullalan or dextran and most preferably dextran.

In another embodiment, the treating agent is used in conjunction with a filter aid in the filtration of the caustic sodium aluminate solution. Preferably the filter aid is calcium aluminate and most preferably a 12% aqueous suspension of calcium aluminate.

Such a filter aid is useful when the caustic sodium aluminate solution is filtered by a Kelly pressure filter. Such a filter aid may not be required in all circumstances, eg, where a sand filter is used to filter the caustic sodium aluminate solution.

In a further preferred embodiment, the treating agent comprises up to 10 ppm preferably up to 5 ppm of dextran and up to 200-300 ppm of starch.

In still another preferred embodiment, the treating agent comprises a dextran to starch ratio of between 9:1 and 1:9.

In a further aspect, the present invention provides an improvement in the Bayer process wherein bauxite is added to a caustic solution to produce a slurry of sodium aluminate solution and an insoluble red mud fraction which is then subjected to a thickener and separation step to produce a thickener overflow, said thickener overflow being subjected to filtration wherein a blend of a polysaccharide and starch is added to the thickener overflow as a treating agent prior to said filtration.

The present applicant has surprisingly found that at least part of the dextran normally used as treating aid in the filtration step of the Bayer process can be replaced with starch without any substantial loss in filterability. Indeed the addition of certain blends of dextran and starch as a filter aid may result in increased filterability of the liquor as compared to dextran alone as a filter aid.

Clearly this has significant advantages since starch is only a fraction of the cost of dextran. Any replacement of the dextran by a low-cost product such as starch will substantially increase the commercial viability of the process.

BEST MODE FOR CARRYING OUT THE INVENTION

To illustrate the advantages of the invention the following results are presented by way of example only.

Filtration tests were conducted on the green liquor at a typical alumina plant using the Bayer process plant, the results of which are shown in the table below.

Dextran was provided as a 7% aqueous solution. The starch component was a 10% (100 g/l) aqueous solution produced by adding powder to 10 g/l sodium hydroxide and agitating at 60° for 15 minutes.

As shown under product ratios, several different blends of the treating agent were used in the filtration tests. Test number 2 uses a simple aqueous solution of dextran with no addition of starch. Tests 4, 6 and 8 use varying dextran/starch ratios and test 10 uses a simple aqueous solution of starch. Each test was compared with a corresponding blank which did not use any treating agent.

The times for filtering various quantities (50 ml, 100 ml and 150 ml) were measured. The filtration rates were then calculated and these rates compared with the corresponding

blank to provide a percentage measure of the increase/decrease flotation rates (%50, %100 and %150).

It is clear from the results below that the blending of the dextran treating agent with starch provides no real significant decrease in filterability of the green liquor and in fact in some instances provides an advantage. When using an aqueous solution of dextran as the treating agent, there is an average improvement in filterability of around 52%. When starch, however, is mixed with the dextran there is a slight reduction in filterability but a substantial cost saving. Tests 4, 6 and 8 have an average improvement in filterability over their corresponding blank of around 37%, 41% and 46%. This compares very favourably with the pure dextran treating agents.

Accordingly, it is clear that even small additions of starch to the dextran treating agent provide significant cost saving without any substantial reduction in the filterability of the green liquor. These results are quite surprising since, as shown in tests 9 and 10, using the treating agent made purely of starch ie without any dextran, provides no improvement in the filterability of the green liquor over an untreated liquor.

It is envisaged that the quantity of starch added to the dextran may be quite high, even as high as 9 times the quantity of dextran since, as shown in test 8 which has a dextran/starch ratio of 25/75, there is minimal effect on the filterability of the green liquor as compared with the pure dextran treating agent.

It will be clear to persons skilled in the art that the present invention may be embodied in other specific forms without departing from the spirit or scope of the inventive idea. For example, it is possible that dextran may be replaced by another polysaccharide such as pullalan in the treating agent. It is also envisaged that the present invention is

suitable for various types of filtration in the Bayer process eg Kelly pressure filter, sand filter etc.

DATED this 20th day of January 1999

NALCO CHEMICAL COMPANY

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TEST	PRODUCT	PRODUCT RATIO	DOSE (PPM)	TIME FOR 50 MLS	TIME FOR 100 MLS	TIME FOR 150 MLS	RATE 50 50	RATE 100 100	RATE 150 150	% 50	% 100	% 150	Average
1	Blank	-	0	50	141	278	1.00	0.71	0.54				
2	85715/PE200	100/0	5	32	94	185	1.56	1.06	0.81	56.3	50.0	50.3	52.2
3	Blank	-	0	46	120	210	1.09	0.83	0.71				
4	85715/PE200	75/25	5	34	86	155	1.47	1.16	0.97	35.3	39.5	35.5	36.8
5	Blank	-	0	57	140	238	0.88	0.71	0.63				
6	85715/PE200	50/50	5	39	100	175	1.28	1.00	0.86	46.2	40.0	36.0	40.7
7	Blank	-	0	57	137	233	0.88	0.73	0.64				
8	85715/PE200	25/75	5	36	96	171	1.39	1.04	0.88	58.3	42.7	36.3	45.8
9	Blank	-	0	57	131	216	0.88	0.76	0.69				
10	85715/PE200	0/100	5	58	131	215	0.86	0.76	0.70	-1.7	0.0	0.5	-0.4

85715 - 7% aqueous solution of dextran

PE200 - 10% aqueous solution producing by adding powder to 10 gpl NaOH and agitating at 60% for 15 mins